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1. a copy of Przemysl
Elektroniczny, Issue No. 12 of July 1963 containing
information on the electronics industry in the USSR.
The publication was issued by the Institute of Tele-
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restriction "For Internal Use Only."

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2. An English translation [redacted]
covers developments made in the industry from 1955
to 1961 [redacted]

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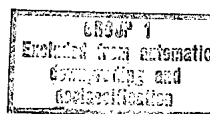
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Przemysl Elektroniczny, No. 12, July 1963, published
in Warsaw, Poland, covers information on the electronics
industry in the USSR. The information was written by
Anna Michalescul and the Section for Economic Studies
of the ITR (Instytut Tele- i Radiotechniczny, Institute
of Tele- and Radio-Technology.)

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In 1955, the production of radio-technical equipment was 1,080 percent greater than in 1940. In 1954, seven times more radios and television sets were produced than in 1947.

The most important problem in electronics now is to achieve reliability and micro-miniaturization of radio-electronic equipment. Scientific work is now conducted in the USSR on this problem.

Micro-miniaturization is accomplished through the use of micro-modules of the technology of thin film and of monolithic electronic circuits. The advantages of micro-miniaturization are many; for example, in the standard method of assembly (with electronic tubes), each sub-assembly has a volume of about 100 cubic centimeters.

With miniature tubes, each sub-assembly requires about 10 cubic centimeters, whereas with semi-conductors, each sub-assembly requires only one cubic centimeter. With micro-modules and with the technology of thin film, 100-200 sub-assemblies can be placed in one cubic centimeter; and with monolithic electronic circuits, over 1,000 sub-assemblies can be placed in one cubic centimeter.

In addition to a reduction in size and weight of ~~the~~^{the} equipment, the

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use of micro-miniaturization improves the reliability of the equipment, reduces consumption of electric power, and increases the possibility of production automation.

At the Academy of Sciences of the USSR, theoretical and experimental work on the use of electronics in electric power is now being conducted. The utilization of the results of these studies will enable ~~the~~ transmission of electric power in open space, for example, transmission of electric energy to sputniks.

Because of the great importance of the scientific research work now being conducted, the coordination of this work and the introduction, as rapidly as possible, of new scientific achievements into production play an important role. On this subject, several resolutions have been issued in the USSR; for example, a few social organizations have been created whose tasks is to coordinate the work of scientists, engineers, radio amateur operators, inventors, and others. One of these organizations is the Society for Scientific and Technical Radio-technology and Communications ^{DIA} ~~Me~~ imienia A. S. Popov. This society was organized in 1945 and has a membership of about 60,000 persons.

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2. PRODUCTION

Radiophonic Equipment

The following table shows the production of radiophonic equipment in the USSR in selected years:

ITEMS Wyszczególnienie	1913	1940	1955	1958	1959	1960	1961
			w tys. sztuk (in 1000)				
RADIOS AND CONSOLE RADIOS Radia i radiole*	-	160.5	3549	3902	4035	4165	4228
RESIDENTIAL WIRE-BROADCAST Głośniki mieszkaniowe radiowe	-	1766	8294	3537	4187	5000	5468
LOUDSPEAKERS							

* W tym samochodowe i magnetofony
INCLUDING AUTOMOBILE AND TAPE RECORDERS

The following tables shows the sale of radios in the USSR in selected years:

ITEMS Wyszczególnienie	1913	1940	1955	1958	1959	1960	1961
			w tys. sztuk (in 1,000)				
TOTAL / Ogółem	-	156	3474	3686	3888	4051	4132
INCLUDING THOSE FOR w tym dla ludności	-	45	1320	1449	1377	1561	1498
wiejskiej RURAL POPULATION							

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The development of semi-conductor technology enabled series production of small semi-conductor radios, which are superior ~~to~~ tube radios because of the ^{lower} ~~lower~~ electric power consumption.

By the end of the Seven-Year Plan in 1965, the electronic industry of the USSR will produce about 22 million radios and 9 million television sets.

Television sets

The following table shows the production and sales of television sets for selected years.

ITEMS Wyszczególnienie	1913	1940	1955	1958	1959	1960	1961
	w tys. sztuk (in 1,000)						
Produkcja PRODUCTION	-	0,3	495	979	1277	1726	1945
Sprzedaż SALES	-	-	-	-	-	-	-
Ogółem TOTAL	-	0,3	483	912	1132	1528	1803
W tym dla ludności wiejskiej INCLUDING THOSE FOR RURAL POPULATION	-	-	46	74	122	212	258

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The following table shows the kinds of television sets produced by the electronics industry, and the characteristics of the sets.

Model	Kinescope		TUBES Lampy	DIODES Diody	SENSITIVITY Czułosc mV
Neža /	14"	70°	15	11	200
Trembita	17"	110°	17	8	100
Možna	17"	110°	20	15	50
Sygnal	17"	110°	20	15	50
Temp 6	17"	110°	18	12	100
Rubin 104	17"	110°	18	11	50
Salut	22"	110°	20	15	50
Ukraina	22"	110°	18	14	50
Temp 7	23"	110°	18	12	75
Družba	22"	110°	20	15	50
Almaz 105	22"	110°	22	14	100
Symfonia BELORUSIA	22"	110°	24	21	50
Bialorus 5	17"	110°	18	14	100
Moskwa (odbiornik przenośny) PORTABLE SET	9"	70°	26 tran- zysto- rów TRANSISTORS	17	100

IZUMRUD
~~Smaragd~~-204 television set, with a screen measuring 0.9 x 1.2 meters, is adjusted for color television program. With this large screen, 50-100 persons can view a program; hence, it is found in clubs, sanatoriums, and reading clubs.

IZUMRUD
~~Smaragd~~-205 is another type of the television set. These types of television sets are also adapted to receive black-and white programs.

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Electronic Calculating Machines

The first electronic calculating machine in the USSR was built in the Mathematical Institute of the Ukraine Academy of Sciences in Kiev. Work on this machine, the MESM digital machine, was started in 1948.

In 1952, a large BESM calculating machine was built at the Academy of Sciences of the USSR. This machine has been used for scientific and designing-structural work. In 1959, these machines were modernized through replacement of cathode-tube memory with more efficient ferrite memory; ~~vac~~ tubes were replaced with semi-conductors. This machine operates with a speed of 8,000-10,000 operations per second.

The next large calculating machine was the Striela, which was equipped with a memory of greater capacity than the memory of BESM machine. The Striela was built in 1953 at the laboratory of the Designing Bureau for Machine Construction and for Automatization.

In 1960, construction was completed of the M-20 machine. This machine is used for designing and construction work. The speed of the operations of this machine is 20,000 operations per second. During this period, several small- and average-size machines were built in some scientific laboratories. Because of their construction, their sphere of operation is limited. For example, the TSEM-1 and the URAL solve mathematical problems; the M-3 ~~PERFORMS~~ ^{PERFORMS} designing and construction calculations; the Minsk I performs designing and construction calculations; the Minsk II performs designing and construction calculations; and solves scientific problems; and the Sietun solves scientific problems.

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Some of these types of machines are produced in series; URAL and M-3 machines, since 1955. Since 1957, an average of 5 of these machines has been produced a month.

In 1959, a modern, multi-sector machine, the K^{EV}ew, was built at the Calculating Center of the Ukraine Academy of Sciences. This machine is capable of developing several programs at the same time. It is equipped with 2,000 miniature tubes. The K^{EV}ew machine is used to solve complicated mathematical problems, and is also used by industrial enterprises to direct and control technological processes.

Besides the universal machines, several types of machines with special usages have been built in the USSR. For example: Krystal machines perform calculations in the field of crystallography; Pogoda, in the field of meteorology; Luch, in the field of optics; ^{and} SESM-1, in the field of hydrology and hydrotechnology.

The SESM-1 machine was the first machine in Europe ^{to} ~~solving~~ ^e linear equations with 400 unknowns. It substitutes the work of 20 mathematicians equipped with electromechanical arithmometers. Only one engineer and one technician is needed to service the SESM-1 machine.

Electronic calculating machines ~~are~~ ^{are of} great economic importance because of their use in industrial enterprises in planning and in operative control of production processes. They are particularly

important in enterprises and divisions producing a wide assortment of products, using for this purpose automatic equipment. The ~~SES-1~~ ^{VELIKIY}

^[NOT FURTHER IDENTIFIED] Tool Plant ^{is} in Baku ~~is~~ supposed to be equipped with digital and analog ^{o ve} machines. A machine ^{is} ~~now~~ under construction in Tiflis for automatic

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control of the operations of an iron and steel metallurgical plant.

Among the many types of machines constructed specially for guiding and controlling production, one must mention the Mars-300 machine and the Kijev universal machine ~~for~~ ⁹ control, which was built in 1961 and has a speed of 6,000-8,000 operations per second.

Ural is the most recent model of a standardized, automatic digital machine. With this machine, problems in ~~several~~ ^{SEVERAL} spheres can be solved, among others, in planning and ^{IN} ~~analyzing~~ ^{zing} production. ~~Its~~ ^{ITS} average speed in solving economic problems is 9,000-10,000 operations per second.

It is estimated that in mid-1962 there were about 1,000 machines of various types and sizes in operation in the USSR.

3. RADIO NETWORK

^{DURING} ~~the~~ the entire day ~~are~~ ^{ARE} radio programs broadcast in the USSR. At the same time, programs II and III of the basic program, transmitted ^{Moscow time} daily from hours 0600 to 2400, are broadcast. This is a daily program intended for outlying areas of the country.

The radio program is prepared in different languages of the people residing in the USSR. The program is broadcast from Soviet republics, autonomous republics, and national okrugs.

Radio broadcasting in the USSR is conducted by two methods: wire-broadcasting and non-wire broadcasting.

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Seventy-fivepercent of radio programs are received through wire-broadcast network and only 25 percent through radio sets.

The following table shows the number of wire broadcasting centers in the republics of the USSR in selected years.

SOVIET REPUBLICS Republiki związkowe	1940	1955	1958	1959	1960	1961
	w tys. sztuk (w tys. sztuk)					
ZSRR - ogółem <i>TOTAL USSR</i>	5853	19544	27117	29155	30838	32096
RUSSIAN FEDERATION Federacja Rosyjska	4231	12687	16637	17647	18405	19021
Ukraine ^e BELO RUS Białoruś	1047	3974	6013	6618	7203	7631
Uzbekistan	66	414	746	832	887	906
Kazakhstan ^K GEORGIA Gruzja	146	562	821	892	968	1009
AZERBAIDZHAN Azerbajdżan	55	212	298	309	320	332
LITHUANIA Litwa	51	167	271	306	330	338
MOLDAVIA Moldawia		105	150	163	167	169
LATVIA Łotwa	11	185	312	359	397	434
Kirgizja		135	172	178	183	186
Tadżykistan ^{TA}	23	119	169	186	202	212
Armenia	15	88	131	145	148	157
Turkmenia	33	93	125	132	139	136
Estonia	25	94	128	138	150	160
		61	76	79	81	83

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The following table shows the development of radio broadcasting in the USSR.

ITEMS Wyszczególnienie	1913	1940	1955	1958	1959	1960	1961
	w tys. sztuk (in millions)						
NUMBER OF WIRE-BROADCAST Liczba głośników loud- radiofonii prze- ^{SPEAKERS} wodowej	0	7.0	33.3	51.3	57.5	63.4	69.1
Liczba radioodbior- ników NUMBER OF RADIOS	0	1.1	13.0	21.7	24.7	27.8	30.5

The following table shows the number of ^{wire broadcast} loudspeakers and radio per 1,000 persons.

Głośniki radiofonii przewodowej: WIRE-BROADCAST LOUDSPEAKERS	Odhiorniki radiofoniczne: RADIOS
1940 r. - 36.7	1940 r. - 5.8
1955 r. - 166.1	1955 r. - 65.0
1960 r. - 300.0	1960 r. - 131.1
1961 r. - 317.0	1961 r. - 140.0

It was decided to develop wire broadcasting network because of the following factors: uncomplicated servicing, ^{the} possibility of broadcasting local programs from wire broadcasting centers, lower power consumption, and ^{the} possibility of receiving programs in localities without electricity.

During the current seven-year plan, the number of wire broadcasting loudspeakers increased by 5 million within a period of three years, of which 3 million loudspeakers were in rural areas. At the same,

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200,000 kilometers of aerial lines and 150,000 underground lines were built, and 60,000 villages were connected to the radiobroadcasting network. Through this, over 92 percent of sovkhoses and 89 percent of kolkehozes are now connected to radiobroadcasting transmission network, or have their own wire broadcasting centers.

Ultra-short wave broadcasting is expanding at a rapid rate. In 1959, there were 35 ultra-short wave broadcasting stations in the USSR, whereas, in 1961, there were 60. Because of this development, special programs are being introduced for ultra-short wave radio listeners, ~~PERMITTING~~ ~~THE~~ ^A selection of ~~THE~~ programs.

Construction of a new, automatic ultra-short wave station was started in 1961. This station will broadcast two programs and will, also, act as a transmission station. For a better utilization of stations operating on ultra-short wave and for a greater reach of the programs on the network of the stations, the stations were located at a distance of 120-140 kilometers from each other. To achieve these goals, receiving equipment ~~WAS~~ ^{HAS BEEN} automatized.

Through the introduction of new technical equipment and through improved effectiveness in the operation of stations, the reception of radio programs ~~WAS~~ ^{HAS BEEN} greatly improved.

4. TELEVISION NETWORK

The development of television in the USSR dates from 1956. At that time, there 12 television broadcasting stations, whereas in 1961, there were 112. Television programs are now broadcast from 130 television

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centers, including capitals of all republics and many industrial centers of the country, which includes over 90 million persons with television sets estimated at 8 million.

The use of modern cable main lines and of radio transmission lines has made possible the activation of a few new directions, as for example, Moscow-Leningrad, Moscow-Kiev, and others, which can improve the transmission of the program of Central Television through local retransmission television stations.

In 1959, construction of television centers was started in Ashkhabad, Stalinabad, Khabarovsk, Grozny, Zaporozhe, Komsomolsk, Kazan, Petrozavodsk, and a few other cities. Television transmission stations were built in Andizhan, Bryansk, Tambov, Krivoi Rog, and other cities. Now in the stage of planning and designing are over 40 television centers and transmission stations. Moreover, there will be a further expansion of the network of low-power transmitters. There are now about 250 retransmission points.

*The following table shows the number of television centers and television retransmitting stations in selected years.

see *

Liczba ośrodków i retransmisji stacji telewizyj- nych w poszcze- gólnych latach (see *)	1913	1940	1955	1958	1959	1960	1961
	-	2	18	139	210	275	347

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In 1960, regular experimental work on color television was started in Moscow and Leningrad. After complete mastery of the selected system and ^{the} elimination of shortcomings, color television will be introduced in a number of television centers in the USSR, primarily in capitals of the republics of the union.

The now expanding low-power television ~~transmitters network of~~ is of great significance in increasing the reach of television programs. The low cost of this equipment and the fact that the transmitters do not require constant service because they are automatic, extends television programs to tens of thousands of persons without great expenditures. Construction has been started in Moscow of the Central Television Center, which will broadcast two black and white television programs and one experimental color television program. In the future, the broadcasting station of Moscow Central Television Center will broadcast simultaneously six radio programs, and five television programs, four of which will be black and white ^{programs} and one, color. The equipment of the station is so ^a adjusted that the number of color programs ~~may~~ ^{can} be increased. One of the programs will be of an educational character.

The program of the Moscow Central Television Center can be obtained within a radius of 120-130 kilometers of the Center (the range area will be increased four to five times).

It has been decided to expand nation-wide ^{television} ~~television~~ network within the next 20 years to such an extent that the central programs can be viewed in the entire area of the USSR.

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Transmitting of television program was started in the spring of 1961 during the flight of the first cosmonaut. Gagarin's welcome was viewed by persons via television in England, Poland, Sweden, Czechoslovakia, and a few other countries.

By the end of the current seven-year plan (1965), it is estimated that there will be 15 million television sets in the USSR; in 1980, each family will have a television set.

In the capitals of the soviet and the autonomous republics, television programs will be transmitted in two languages-- in the Russian language and in the language of the area. Special devices for the television sets, which will enable the reception of a program in a given language of an area, are now being developed.

On 1 April 1960, there were 3,915,000 television subscribers in the USSR, or one million more than on 1 April 1959.

The following table shows the number of television sets in the respective republics of the USSR.

1. ^{RUSSIAN FEDERATION} Federacja Rosyjska	2 875 000
2. Ukraina	575 000
3. Uzbekistan	94 000
4. ^{LATVIA} Lotwa	71 000
5. Kazachstan	63 000
6. ^{ARMENIA} Azerbajdzan	52 000
7. ^{BELOARUS} Białorus	46 000
8. ^{GEORGIA} Gruzja	39 000
9. Estonia	32 000
10. Armenia	27 000
11. ^{LITHUANIA} Litwa	14 000
12. ^{MOLDAVIA} Mołdawia	14 000
13. Kirgizja	9 000
14. Tadżykistan	4 000
15. Turkmenia	3 000

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In Moscow and the area of Moscow, the number of television sets registered during this time exceeded 1,400,000, and in Leningrad and the area of Leningrad, 425,000. The number of television sets registered in other areas of the USSR are as follows: Sverdlovsk, 122,000; Gorki, 64,000; Kuibyshev, 49,000; Rostov, 46,000; and Tula, 46,000.

5. TELEPHONE NETWORK

In 1940, 36 percent of the telephone centrals were automatic, and in 1955, over 50 percent.

The following table shows the expansion of communication in the USSR in selected years.

ITEMS Wyszczególnienie	1913	1940	1955	1958	1959	1960	1961
TELEPHONES TOTAL NUMBER OF Ogólna liczba aparatów telefonicznych w tys. sztuk (in 1,000)	259*	1225	1932	2370	2513	2697	2932
in cities w miastach	259*	1044	1663	2032	2132	2284	2484
in RURAL AREAS we wsiach	-	181	269	338	381	413	448
NUMBER OF TELEPHONES CONNECTED WITH Liczba aparatów włączonych do automatycznej centrali telefonicznej	-	414	866	1180	1311	1472	1686
CENTRALS w miastach IN CITIES	-	414	856	1155	1273	1417	1614
we wsiach IN RURAL AREAS	-	-	10	25	38	55	72
NUMBER OF LONG-DISTANCE TELEPHONE Liczba międzymiastowych rozmów telefonicznych w mln	0.3*	92	135	163	172	185	197

* Na terenie ZSRR do 1939 r.
IN the USSR up to 1939.

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The use of the multi-channel cable , through which 12 conversations can be conducted at the same, was started in 1941. During the 1950's , high-frequency apparatus for aerial and cable communication was put in use. Also, concentric cable, enabling 2,000 conversations at the same time, was put in use.

The automation of inter-regional telephone network was also started during this time. Automation of telephone centrals was started in 1950.

The following table shows the number of telephones in municipal telephone centrals in the USSR in selected years.

Republiki związkowe	1940	1955	1958	1959	1960	1961
	w tys. sztuk (in 1,000)					
ZSRR ^{USSR}	1044	1663	2032	2132	2284	2484
^{RUSSIAN} Federacja Rosyjska	667	1088	1310	1374	1472	1593
^{UKRAINE} Ukraina	162	222	279	286	305	328
^{BELOARUS} Białoruś	32	43	52	54	56	62
Uzbekistan	16	32	44	45	50	56
Kazachstan	22	51	65	70	76	84
^{GEORGIA} Gruzja	22	37	42	44,4	47	51
^{AZERBAIDZAN} Azerbajdżan	20	37	47	51	53	58
^{LITHUANIA} Litwa	18	22	30	33,4	36	40
^{MOLDAVIA} Mołdawia	3	14	16	16,4	17	19
^{LATVIA} Łotwa	41	41	52	56	61	66
Kirgizja	4	11	13	13	14	16
Tadżykistan	4	9	12	13	14	16
Armenia	9	19	26	30,4	35	40
Turkmenia	5	12	15	15,3	17	19
Estonia	19	25	29	30	31	36

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The following table shows the number of automatic telephones connected with municipal telephone centrals in the USSR in selected years.

Republiki związkowe	1940	1955	1958	1959	1960	1961
	w tys. sztuk (in 1,000)					
ZSRR USSR	414	856	1155	1273	1417	1614
RUSSIAN FEDERATION Federacja Rosyjska	262	613	807	870,6	954	1060
Ukraina ^G	61	93	133	149	166	189
BELOARUS ^S Białoruś	8	12	19	24,5	31	37
Uzbekistan	5	10	15	19	21	28
Kazachstan	0,3	12	19	23	27	38
GEORGIA ^A Gruzja	10	19	21	24,7	29	38
Azerbajdżan ^A	11	20,5	26	27	30	32
LITHUANIA ^A Litwa	9	10,6	18	23	26	32
MOLDAVIA ^A Mołdawia	1	5	8	9	11	12
LATVIA ^A Łotwa	32	25	35	38,5	47	56
Kirgizja ^A	0,1	4	7	8	10	11
Tadżykistan ^A	0,1	1	4	5	5,3	6
Armenia	0,3	11	19	26	32	38
Turkmenia	0,3	4	6	6	7	10
Estonia	14	16	18	20	21	27

In 1940, there were 6.4 telephones per 1,000 persons in the USSR; in 1955, 9.7 telephones; in 1960, 12.7 telephones; and in 1961, 13.4 telephones.

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6. EXPORT

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The following table shows export of some types of electronic equipment to various countries.

Wyszczególnienie	1955	1956	1957	1958	1959	1960	1961
RADIOS AND CONSOLE Radioodbiorniki RADIOS 1 radiolo (tys. szt.)	45,5	12,7	14,8	22,1	29,8	18,6	27,7
Albania	-	-	-	-	-	3,5	1,0
Bułgaria	-	-	7,7	2,4	22,3	1,7	4,7
Rumunia	40,2	3,7	0,3	6,2	2,2	4,5	5,9
Czechosłowacja	-	3,0	-	0,1	-	-	-
Afganistan	0,4	4,5	1,0	0,4	0,2	-	-
Wietnam	-	-	-	-	-	0,1	1,6
Iran	0,2	0,6	-	0,1	-	-	-
Korea	0,4	0,3	0,06	7,4	4,3	-	-
Mongolia	1,3	0,3	-	4,0	-	-	-
TELEVISION SETS, IN 1,000 Telewizory (tys. szt.)	-	15,6	89,2	87,7	74,9	103,8	78,5
Bułgaria	-	-	-	-	0,6	1,7	2,9
Polska	-	-	-	8,0	10,0	6,0	34,8
Rumunia	-	0,9	7,2	20,0	10,0	28,1	12,6
Finlandia	-	-	0,1	0,2	2,1	0,5	-
Czechosłowacja	-	14,6	81,9	52,7	51,6	67,1	28,1
Irak	-	-	-	-	0,2	0,4	-
Chiny	-	-	-	6,8	-	-	-
INCANDESCENT LAMPS, IN MILLION Żarówki (mln szt.)	0,7	2,7	8,0	5,5	3,6	3,8	10,8
Albania (tys. szt.)	15,1	2,5	18,0	81,0	43,0	10,0	37,0
Bułgaria	140,5	35,4	314,0	63,0	656,0	96,0	168,0
Węgry	0,2	20,8	13,1	21,0	12,0	49,0	67,0
Grecja	-	-	-	-	-	300,0	6,0
Islandia	-	-	-	130,0	414,0	155,0	69,0
Polska	95,0	144,6	45,0	71,0	47,0	30,0	47,0
Czechosłowacja	30,0	1600,0	5400,0	2500,0	100,0	100,0	100,0
Jugosławia	-	100,0	-	-	-	-	-
Irak	-	-	-	-	312,0	413,0	69,0
Iran	-	-	-	328,0	601,0	16,0	1023,0
Chiny	101,8	29,6	63,0	28,0	1,0	16,0	23,0
Korea	40,6	54,0	79,0	26,0	42,0	8,0	40,0
Mongolia	254,0	312,7	373,0	200,0	58,0	293,0	937,0
Gwinea	-	-	-	-	147,0	-	-

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Export Table (continued)

ITEMS	1955	1956	1957	1958	1959	1960	1961
Wyszczególnienie							
UNITED ARAB REPUBLICS							
Kraje Republiki							
Arabskiej	-	-	-	62.0	178.0	128.0	33.0
Tunis	-	-	-	-	29.0	91.0	132.0
Etiopia	-	46.0	33.0	-	-	137.0	62.0
Kuba	-	-	-	-	-	1100.0	5500.0
Birma	-	403.9	887.0	762.0	14.0	-	-
RELAYS, IN 1,000							
Przekazniki (tys.szt.)	-	-	-	-	-	10.5	11.5
CONDENSERS, IN 1,000							
Kondensatory (tys.szt.)	-	-	-	-	-	138.5	169.5

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